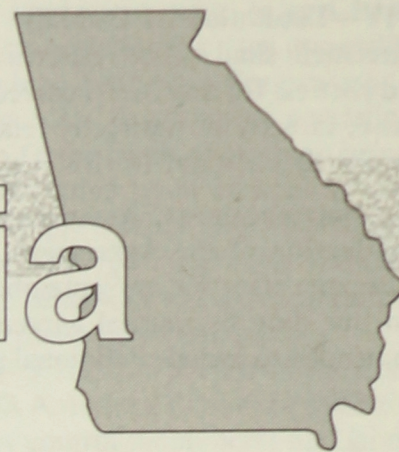


Georgia



GIS activities in Georgia's State government are primarily administered by the Department of Community Affairs (DCA) and the Department of Natural Resources (DNR). The largest and first installation was in 1985, when the Georgia DNR served as a pilot state agency for a cooperative project with the U.S. Environmental Protection Agency (EPA). DCA serves as the governing agency for the state's comprehensive Planning Act of 1989. The act provides funding for GIS implementation and digital data development in DCA, DNR and 18 Regional Development Centers located throughout the state. The act establishes an institutional framework staffed by various DCA groups that coordinate statewide geographic information. Groups currently involved with those activities in Georgia include the State Mapping Advisory Board and its subcommittees; and the Governor's Development Council and its Coordinated Planning Implementation Committee and Data Advisory Group. The Georgia GIS Exchange is also being developed under the authority of the Atlanta Federal Executive Board.

1 Origins of State Initiatives

Georgia has coordinated and developed geographic information since the mid-1970s, when Landsat imagery was introduced and the Department of Natural Resources (DNR) began development of a 1:24,000 scale map base. Efforts to develop local land information systems (LIS) began in the early 1980s, when state inventories of related county activities were compiled. Local governments helped to encourage the establishment of a statewide approach. Barrow County encouraged state involvement by developing a state LIS plan in 1986 and by conducting a pilot LIS project with the Surveyor Department of the Office of the Secretary of State and Georgia Institute of Technology's Planning School.

GIS activities in Georgia's state government began in 1985 in DNR's Environmental Protection

Division (EPD). It initiated a three-phase comprehensive data management pilot project with the U.S. Environmental Protection Agency (EPA) as a variety of issues arose, including the need for potable water in northern Georgia. The purpose of the project was to develop and implement data management systems to better support the environmental management objectives of both the state and U.S. EPA. It was also designed to provide model concepts, approaches and systems which enhance state/U.S. EPA partnerships. Georgia benefited by using U.S. EPA's data and systems, simplifying reporting obligations. U.S. EPA benefited by elimination of duplicative data entry, more timely data and reduced program misunderstandings. Funding for the project was jointly sponsored by the state and U.S. EPA, with U.S. EPA funding approximately \$600,000 of the total project cost of over \$1.5 million. The U.S.

Geological Survey's Water Resources Division also became a partner in the project as the division was developing a statewide hydrography layer for the state.

After an initial design phase, Phase II of the project began implementation of data integration systems across program lines to support environmental decision making, implementation of statewide GIS, and identification and use of database systems to support toxics and risk assessment programs. The critical management issue was identified as the need to implement an overall strategy for groundwater management.

Phase III was initiated in 1988 and completed in May, 1990. The goal of the phase was to increase the efficiency and effectiveness of environmental data management systems. While Phase I and II concentrated on data integration, Phase III was initiated to determine a way to better use derived information. It also investigated other methods for data entry, including optical scanning, to reduce the cost of data input and quality assurance. GIS was also used to identify vulnerable environmental areas, and implement electronic notification of local governments as first responders for hazardous chemical spills.

Growth in local government LIS activities during this time led to the Legislature's establishment of the Joint Legislative LIS Study Committee in 1987 through Senate Resolution 92. The Committee was composed of executive and legislative branch state officials, as well as local officials, and was directed to "study the conditions, needs, issues and problems related to the status of land records in Georgia." The committee was asked to evaluate automation, determine the best way to assist local governments, determine necessary funding levels, and propose legislation. It concluded in its December, 1987 report that "land information has a direct affect on 90% of all local government decisions . . . [and] as such the availability or unavailability of this information has an impact on a wide range of issues such as land conveyances, ad valorem tax administration, property tax inequities, resource allocation and growth management strategies and policies." Citing "an urgent need to initiate a program to correct this problem before it becomes a crisis," the committee recommended establishing a State Land Information and Mapping Advisory Board.

At the same time that interest in modernization of land information recordation was growing in local governments at a technical level, policy level officials at state and local levels were showing increasing attention to growth management and the need for coordinated planning. The Governor appointed a Growth Strategies Commission that began work in June, 1987. It prepared a Fi-

nal Report on November 2, 1988 titled *Quality Growth Partnership: The Bridge to Georgia's Future*. This report established "Quality Growth Partnership" as a blueprint for the state's future. The goal of the partnership is to accommodate growth "without deterioration in quality of life," and upgrade low-growth areas through economic development programs. It recommended a nine-point strategy to address "human needs, build the capacity for growth, safeguard the environment, strengthen local communities, and coordinate state and local efforts." A coordinated data network was recommended to assist these groups with participation by local, regional, state agency and private sector groups in developing demographic, economic, and physical trends and projections.

Also beginning in 1988, due to increasing interest in GIS, the Department of Community Affairs (DCA) awarded four \$25,000 and one \$100,000 Innovative Projects Grants to planning centers known as Regional Development Centers (RDCs). DCA's funding provided for half of the anticipated project costs. The Central Savannah River Regional Development Center conducted three of the five pilot projects. Their first project evaluated the use of databases and GIS for economic development, and specifically industrial parks. The second project evaluated the utility of the Department of Natural Resources' (DNR) natural resources GIS as a planning tool at the local level. Another was for development of routing for local government. The Atlanta Regional Commission developed a RDC GIS implementation guide. The Georgia Mountains RDC evaluated the use of natural resources databases and GIS to locate a reservoir. All the projects concluded that data sharing and transfer can be accomplished in an efficient and useful manner in order to maximize the value of information.

Based on the Joint Legislative LIS Study Committee's work and recommendations in 1987, the 1988 legislature adopted Senate Bill 437, which established the State Mapping and Land Records Modernization Advisory Board, now called the State Mapping Advisory Board (SMAB). The board is administered by the Department of Community Affairs (DCA), as stipulated by the legislation. The board was selected in January, 1989 by the governor, who appointed 21 members that include representatives of the legislature, state agencies, regional commissions, local governments and associations with mapping interests. The purpose of the board, as stated in the statute, is to study land records modernization and determine how to implement land information systems, provide financial incentives for local governments, encourage cost savings, sponsor public information

and educational programs, and develop standards and technical specifications for GIS.

In response to the 1988 Growth Strategies Commission's report, the legislature adopted comprehensive growth management legislation in House Bill 215, known as the *Georgia Planning Act of 1989*. The act includes a legal foundation; programs for comprehensive, coordinated statewide planning integrated within state government; and regional and local agencies. It created the Governor's Development Council, and revised provisions related to the Department of Community Affairs (DCA) and the Board of Community Affairs. It replaced area planning and development commissions with Regional Development Centers (RDCs). It also provided for the powers, duties, and responsibilities of local governments and the Department of Natural Resources "with regard to the development and implementation of minimum land use standards to protect natural resources, environment and vital areas of the state."

Interagency groups were organized to assist the new Governor's Development Council. The Coordinated Planning Implementation Committee included policy level members and technical task force members. The committee recommended that the DCA should be the responsible state agency for coordinating the database and network and planning among state agencies, RDCs and local governments. The committee was assisted by two work groups, one which addressed planning standards and procedures, resulting in rules adopted in early 1990; the other addressed local, regional and state data needs.

The Data Needs Work Group was established with representatives from state agencies, universities, regional organizations, local governments, utilities and private companies to provide recommendations for the database and network needed to support the recommendations of the Governor's Growth Strategies Commission. The intent of the group was to create a data network that would support planning for both growth management and economic development as its primary mission, but it would also support many other needs of the state. It issued a *Final Report of the Data Needs Work Group* in July, 1989. The group concluded that a distributed database and information exchange network was needed and recommended that "all implementation efforts support the ultimate development of GIS at the state, regional and local levels." The report provides a conceptual model of a database network which would generate, maintain and distribute data. It recommended an open system, with DCA responsible for structuring the database and network to support coordinated planning. "Core data elements"

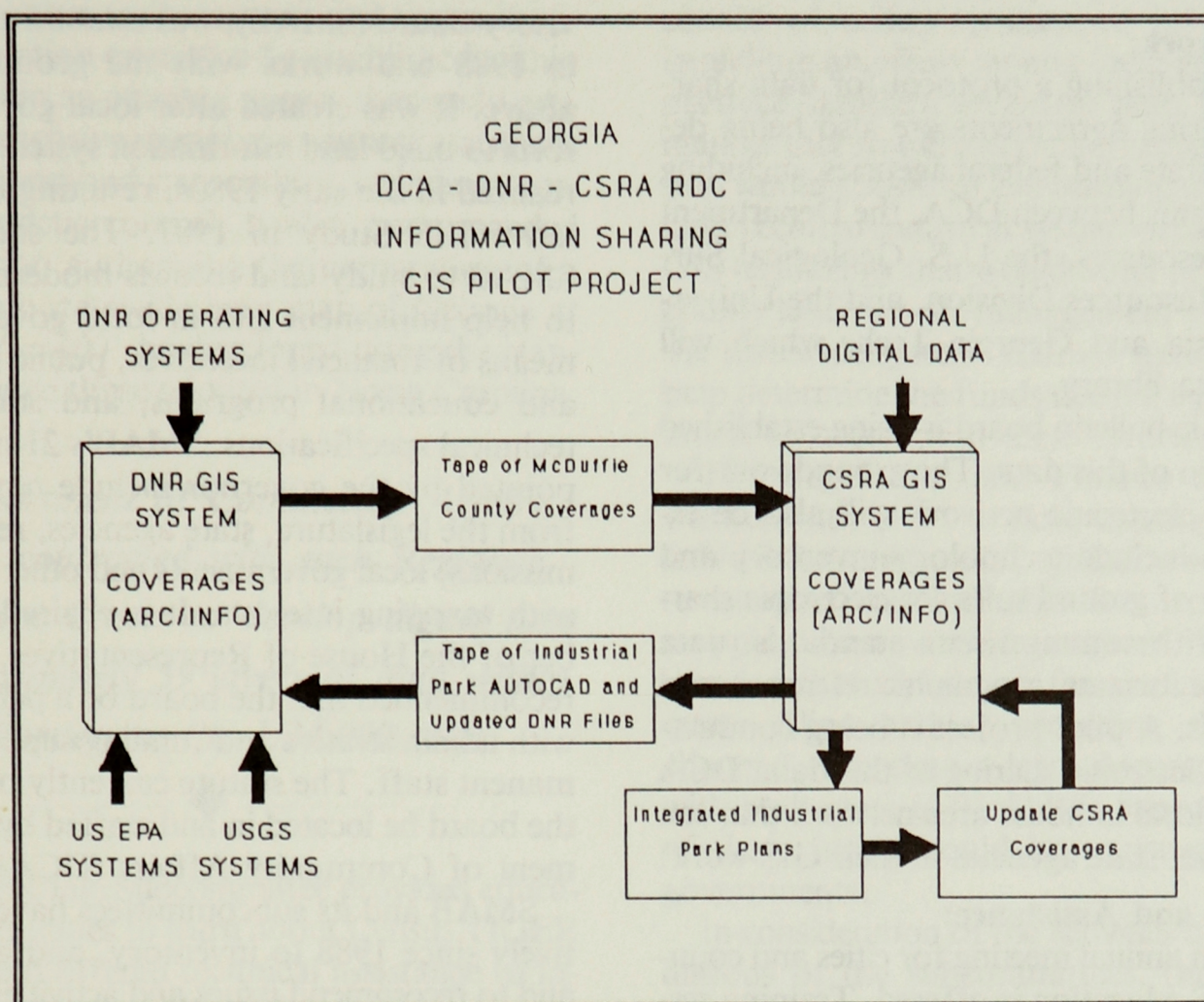
were also recommended by the work group.

The State Mapping Advisory Board (SMAB), also staffed by DCA, worked in coordination with these group. The board met regularly during 1989 and established four subcommittees, including Mapping Standards, Data Standards, Education and Financing. Each subcommittee identified issues and the board published the compilation of these issues and findings in its *First Year Progress Report*. SMAB recommended that the state assist in standardizing, updating and modernizing land records and help implement GIS by assisting local governments and Regional Development Councils (RDCs) "through financial incentives, coordination of data acquisition and programs to share data, and technical assistance programs." The board called for data and mapping standards to be set, including standards for land characteristic data for planning, uniform map accuracy standards, geodetic control densification, common data definitions, and data file formats and protocols. A data dictionary and common statewide database was also requested. Computer-based property valuation was recommended by a majority of the board, and all agreed that GIS should be supported through an implementation plan and educational programs, particularly for local governments.

Efforts to implement the Planning Act began in 1989. Inventories of current activities in counties and cities were compiled. The Regional Development Centers (RDCs) created by this act provide data and technical assistance for local governments attempting to accomplish a distributed data network (rather than centralized database). Implementation of GIS facilities and a coordinated planning process began in the 18 RDCs with one-half of the necessary funding for hardware and software provided by the state. Of the total \$1.7 million appropriated to the RDCs by the state for the Planning Act, approximately \$1 million was allocated for the RDCs for GIS and planning needs.

2 Coordination Efforts, Groups and Activities

Georgia began coordinating and developing geographic information in the mid-1970s. Since the late 1980s, the Department of Community Affairs (DCA) has been the lead state agency for geographic information and GIS coordination. The *Georgia Planning Act of 1989* officially designated DCA for this role, and the act establishes a comprehensive framework of programs that accomplish coordinated, integrated statewide plan



ning and development at local, regional and state levels of government. This legislation extensively revised the responsibilities of DCA, the Board of Community Affairs, and those area planning and development commissions which later became Regional Development Centers (RDCs), agencies which implement coordinated statewide planning. The responsibilities of local governments and the Department of Natural Resources were also revised to account for the need to develop minimum land use standards that protect natural resources and the environment.

Current DCA plans and activities are described in the state's *Plan for GIS and Mapping Development in Support of Comprehensive Planning*, which describes accomplishments and plans of the RDCs, counties, and municipalities. Projects include database inventorying and development of a data network that includes ground rules for electronic sharing of data with common data standards, data definitions, file formats, and geographic references. Specific work conducted to date includes:

1. Database:

The establishment of a tabular database for planning is built by gathering information from state and federal agencies and developing it into Oracle software. This information includes population trends from 1970 to 2010 and state econom-

ic development data. For example, commuting patterns, income levels, unemployment characteristics, housing and community facilities, and natural and historic resources are all categories addressed by the software. Each tabular database includes the highest integrity geographic locator for each data element.

The graphic database for planning is being built from state and federal agencies and inputs into ARC/INFO with some original layers of digital data developed at DCA, including geodetic control points. DCA is developing interim base maps at the 1:100,000 scale using USGS DLGs and post-census TIGER line files. DCA will update the base map as changes are submitted from the RDCs. Each of the 18 RDCs have contracted with DCA to develop digital data at the 1:24,000 scale. Data layers to be developed include transportation, hydrology, topology, land use, water distribution system sewerage collection system, public safety facilities, and recreation locations, as well as educational, cultural and general government facilities. This five-year program is expected to be completed in 1996 and is being funded with \$2.5 million annually with a 50/50 cost share effort. The data must meet National Map Accuracy Standards and those internal quality control standards developed for use by both the RDCs and DCA, and the project includes some field checking of the data as well. Some of this data will be

compiled by DCA for statewide layers, including land use and community facilities.

2. Data Network:

DCA is establishing a protocol for data sharing. Data sharing agreements are also being developed with state and federal agencies, including partnership terms between DCA, the Department of Natural Resources, the U.S. Geological Survey's Water Resources Division, and the University of Georgia and Georgia Tech, which will compile a data library.

An electronic bulletin board is being established for distribution of this data. The groundwork for the statewide electronic network will also be established and include technology inventory and determination of ground rules for electronic sharing of data with common data standards, data definitions, file formats, geographic references and map standards. A pilot project is being conducted to test the electronic sharing of this data. DCA is designing a local in-house area network that can help assist other state agencies in their GIS work.

3. Education and Assistance:

DCA has an annual meeting for cities and counties where GIS education is offered. Training sessions are also provided quarterly for in-house staff, RDCs, and local governments. Plans exist to develop a quarterly newsletter and continue utilization of the monthly URISA newsletter.

Coordination Groups

Various coordinating groups have been established as a result of the Georgia Planning Act and are staffed by divisions within DCA, including the State Mapping Advisory Board, the Governor's Development Council, Planning Advisory Committee, and the Data Advisory Group. The Governor's Development Council consists of 19 state agency directors with the authority to coordinate, supervise, and review planning by state agencies.

Groups have been organized to assist the Development Council. The Planning Advisory Committee includes policy-level members and technical task force members. The Governor's Development Council Data Contacts includes policy-level representatives chosen by members of the Council. This group assists in inventorying of data holdings and hardware and software in use and provides continued input on operation of the data network and data holdings. In addition, the Data Advisory Group, which includes representatives of local governments, federal agencies, state agencies not on the Council, academia and the Regional Development Councils (RDCs), provides continuing input on data needs, operations of the data network, and sources of data.

The State Mapping and Land Records Modernization Advisory Board, or State Mapping Advisory Board (SMAB), was established by statute in 1988 and works with the groups described above. It was created after local government efforts to build land information systems (LIS) were realized in the early 1980s, resulting in the Legislative LIS Study in 1987. The statute directs SMAB to study land records modernization and to help implement LIS in local governments by means of financial incentives, public information and educational programs, and standards and technical specifications. SMAB's 21 members appointed by the governor include representatives from the legislature, state agencies, regional commissions, local governments and other associations with mapping interests. It is chaired by a member of the House of Representatives. SMAB has recommended that the board be a permanent one with administrative and funding support of a permanent staff. The statute currently provides that the board be located in and staffed by the Department of Community Affairs (DCA).

SMAB and its subcommittees have worked actively since 1988 to inventory, and analyze data and to recommend issues and activities to improve statewide coordination. The board advised the state to assist in standardizing, updating and modernizing land records and to implement GIS by assisting local governments and RDCs "through financial incentives, coordination of data acquisition and programs to share data, and technical assistance programs." The board's activities help support the Planning Act. SMAB produced its *First Year Progress Report* in January 1990, and the *1990 Annual Progress Report* in February 1991, both which review many of SMAB's activities and recommendations.

SMAB's work is conducted by its four subcommittees. These groups include the Mapping Standards, TIGER file, Land Records, and Legislation and Finance Subcommittees. The Mapping Standards Subcommittee conducted work to develop a comprehensive *Georgia Mapping Standards Guide* that provides guidelines for local, regional and state planning in Georgia. This guide is based on North Carolina's *Technical Specifications for Base, Cadastral and Digital Mapping*. A "tiling scheme" for base maps of Georgia is being developed that could require that individual mapped areas would be represented on a statewide gridded index that corresponds to the 1000-meter intervals of the Georgia State Plane Coordinate System. The subcommittee decided to adopt the recently-published American Society of Photogrammetry and Remote Sensing (ASPRS) accuracy standards for aerial photography, remotely-

sensed imagery and planimetric maps. Federal standards will also be reviewed.

The subcommittee recommended that a mapping coordination operation be established within DCA or within an attached agency that could provide comprehensive mapping technical assistance to local, regional and state entities, including coordinating geodetic control. It also recommended that legislation authorizing the preparation of a scale-accurate statewide base map of Georgia at a scale of 1' = 400' be developed using the standards similar to those adopted in North Carolina.

The Department of Community Affairs has also contracted with each Regional Development Center to develop digital data for approximately 59 layers of data within their borders at the 1:24,000 scale.

The TIGER File Subcommittee provided educational opportunities to learn about Census TIGER map files, and offered technical assistance to local governments in street naming and house numbering systems. The need for coordinating address improvements was discussed, with consideration given to mandating improvements by way of a uniform system across the state. The Subcommittee also discussed House Bill 1422 (Substitute) known as the *Georgia Emergency Telephone Number "911" Service Act of 1977*, which provides for a fee of up to \$1.50 to be collected from each telephone customer for E-911 services. These monies can be used in street naming and numbering programs at the local level and can be coordinated with SMAB activities. Southern Bell is also encouraging the development of a uniform, county-wide address coding scheme for counties installing E-911 services. The subcommittee recommended that a joint program be developed with other entities to prepare uniform address systems and TIGER file updates, and that legislation be developed requiring the uniform address system for each county and which mandates compliance with these new systems.

The Land Records Subcommittee analyzed conditions and determined that a land records management improvement program would be politically difficult due to "turf" and data sharing problems. The subcommittee concluded that an improvement program was needed, and recommended a three-step approach would be the best possible way to implement such change. The first step would include a comprehensive effort to collect land attribute information that affects

property ownership, including deeds, titles and other legal information. The second step would consist of collecting mapped information and launching an effort among local governments to produce standard cadastral map products in a manner that would meet state standards. The third step would consist of establishing a computerized land records/cadastral system network based on GIS technology that would tie all of the individual county land records management operations into the statewide system. Efforts were also made to help determine the funds needed by local governments to accomplish these efforts.

The Legislation and Finance Subcommittee worked with DCA to hold meetings with Legislative Subcommittees. Legislation was drafted after support was indicated for a comprehensive mapping improvement program. It was recommended that an add-on fee associated with real estate filing and/or recording documents be changed each time a legal document associated with real estate is filed. It is expected that some of these funds would be returned to the local governments.

In consideration of the activities and recommendations of the subcommittees, the SMAB proposed a resolution to create a joint legislative committee, the "Georgia GIS Study Committee," which would study cooperative methods for implementing a statewide mapping program and GIS, including a statewide digital base map at 1:400 and a pool of funds for local work. This recommendation was drafted as House Resolution 83, but was not adopted by the Legislature. Current plans are to have the work conducted by the committee through existing groups. These efforts will include the study of methods to:

- Improve aerial photography, base maps, cadastral maps and other forms of land records,
- Provide funding for the periodic preparation of statewide, scale-accurate aerial photographs and computer-produced base maps that are suitable to serve as a basis for land use planning and development regulation and other state, regional and local government purposes,
- Provide a legislative basis to facilitate and encourage cooperation and coordination among federal and state agencies, RDCs, regulated utilities, and local governments in order to accomplish a comprehensive, statewide mapping and land records program.

The Georgia GIS Exchange is also being developed under the authority of the Atlanta Federal Executive Board, a group composed of leaders of federal agencies located in Atlanta. Its constitution, bylaws, and charter were adopted in May, 1991. The purpose of the Georgia GIS Exchange

is to promote the development of personnel; provide opportunities to exchange knowledge related to GIS techniques, applications, databases, and cost reduction ideas; assist and advise on GIS matters; and publicize activities for the general public. Membership is provided from government agencies in the eight southeastern states; however, membership now includes federal and state agencies in Georgia. Goals of the GIS Exchange include inventorying GIS/LIS initiatives and databases in Georgia and other states, assessing current needs, developing useful databases, and developing a common area registered GIS library to be composed of designated units of the University of Georgia and the Georgia Institute of Technology.

Regional and Local Government Programs

Programs to assist Regional Development Councils (RDCs) and local governments have been underway within the Department of Community Affairs (DCA) since 1985, and are expected to continue. In accordance with the Planning Act of 1989, each of the 18 RDCs has implemented GIS facilities, with half of the necessary funding provided by the state. Of the total \$1.7 million appropriated by the state in 1989 for the Planning Act, approximately \$1 million was allocated for the RDCs for GIS and planning needs. Training sessions are also provided quarterly for in-house staff, RDCs, and local governments.

Quantity purchasing arrangements were provided and installation was completed for each RDC in 1990. Each RDC chose its desired hardware and software, including some VAX, Hewlett Packard and SUN workstations, IBM and compatible personal computers, and Macintosh personal computers. Software used includes ARC/INFO and Comgraphics. DCA has also contracted with each RDC to develop digital data for approximately 59 layers of data within their borders at the 1:24,000 scale. Quality control assurance standards are being used with field checking of the data. These layers will be developed in common and transferred to the state for use by state agencies as well as local governments. The program was designed to help accomplish a distributed network rather than a centralized database and to enable RDCs to serve as an intermediate level between the state and localities. RDCs are employing GIS for land use, policy and demographic data analysis, with TIGER, natural resources and community facilities data. Plans are underway for the RDCs to provide data and technical assistance to local governments.

Previously, DCA awarded four \$25,000 and one \$100,000 DCA Innovative Projects Grants to RDCs for GIS pilot projects focused on economic development, locating reservoirs, developing rout-

ing for local governments, developing a RDC GIS implementation guide, and evaluating the Department of Natural Resources' (DNR) GIS and data as planning tools. DCA's funding provided for half the anticipated project costs. The Atlanta Regional Commission developed a data dictionary for planning purposes. The Georgia Mountains RDC evaluated the use of natural resources databases and GIS to locate a reservoir.

The Department of Community Affairs awarded five Innovative Projects Grants to Regional Development Centers for GIS pilot projects.

The Central Savannah River Regional Development Center conducted three of the five pilot projects. The first of these evaluated the use of databases and GIS for economic development, and specifically industrial parks. As a result of the project, various data transfer techniques were established, and participants were able to exchange digital data; for example between the electric supplier, Georgia Power and the RDC. The resulting standardized base data for the area allowed the participants to present and market industrial parks to business prospects. This pilot project won a 1989 Innovation Award from the National Association of Development Organizations. The National Association of State Development Agencies, an organization of directors of state economic development agencies, also selected the project for an award in May, 1990.

The second project of the Central Savannah River RDC evaluated the utility of DNR's natural resources GIS as a planning tool at the local level. DNR's GIS data was tested in coordination with DCA to evaluate data transfer from DNR to local planning agencies and RDCs and vice-versa. The projects concluded that data sharing and transfer can be accomplished in an efficient and useful manner that maximizes the value of information.

The third project evaluated and established a model process for using GIS in determining optimum routing for local governments.

In addition to these activities with the RDCs, DCA provides free technical assistance for localities for map modernization, database development, and geodetic control. For example, prototype comprehensive plan was conducted with one city to test the availability and applicability of data to meet minimum planning standards. DCA maintains an inventory of GIS activity in

counties and the RDCs, including a listing of land records, planning and public works applications of GIS in the counties. Through this effort to inventory, DCA has identified almost 60 GIS installations in Georgia's local governments, and estimates that at least \$4 to 5 million has been spent regarding GIS and related data in the Atlanta area alone.

*The Department of Community Affairs
has been the official lead state agency
for GIS implementation since
the Planning Act of 1989.*

Policies/Standards

Various documents providing standards and guidelines have been under development since 1989 as a result of the 1989 Planning Act and the recommendations of individual governments and groups. Final *Minimum Planning Standards and Procedures* were adopted by the Board of Community Affairs and ratified by the Georgia General Assembly in 1990. These govern the comprehensive planning process outlined in the legislation. The rules reflect the goals and responsibilities in the development of local and regional plans, as well as requiring participation in compiling the Georgia database and network. Specific requirements included which were based on public hearings held throughout the state before the standards were adopted.

Another major effort concerned common data definitions and land use classifications. A draft *Land Use Classification System for Georgia*, was developed for use by state, regional and local government agencies in preparing comprehensive plans required by the Planning Act. It incorporates several land classification concepts, including the Standard Industrial Classification Code (SIC), the Land Cover Classification Code (Anderson, Level 2) of the U.S. Geological Survey, and the Standard Land Use Classification Code (SLUC) introduced by the American Planning Association. The classification system recognizes local zoning systems, but does not include them because they often differ by locality.

A draft *Data Dictionary* was created to enable common classification of planning-related data and map symbology, legends and formats. This dictionary is being completed by DCA staff, building on the DCA's *Glossary of LIS/GIS Terms* prepared for localities in 1988. Hardware and software specifications were developed for a GIS network and workstations, allowing for a variety

of hardware and software to be used by network participants.

Efforts are also underway by SMAB and its Mapping Standards Subcommittee to finalize the draft *Georgia Mapping Standards Guide*, which will govern local, regional and state planning in Georgia. The guide is in draft form and is based on North Carolina's *Technical Specifications for Base, Cadastral and Digital Mapping*. Standards for uniform mapping, standard geographic references, data definitions, mapping, aerial photography, land records, geodetic control, parcel identification numbering system, coordinate systems, map projections, map scales and accuracy requirements, digital map formats, and symbols and map file exchange formats are included. A "tiling scheme" for base maps of Georgia is being developed that could require individual mapped areas to be represented on a statewide gridded index that corresponds to the 1000-meter intervals of the Georgia State Plane Coordinate System. SMAB's Mapping Standards Subcommittee decided to adopt the recent American Society of Photogrammetry and Remote Sensing (ASPRS) accuracy standards for aerial photography, remotely-sensed imagery and planimetric maps. Federal standards will also be reviewed.

3

GIS in State Government

GIS activities in Georgia are concentrated in the Department of Community Affairs and the Department of Natural Resources, both of which have been leading agencies compared to similar agencies in other states.

The **Department of Community Affairs (DCA)** is the state agency responsible for providing assistance to local governments and implementing statewide planning. It has been the official lead state agency for GIS implementation since the Planning Act of 1989. The main objectives of the GIS program are to provide a statewide GIS network that supports the provisions of the Minimum Planning Standards in the act and to provide data and automated map coverages that can be used to facilitate local planning. Other objectives include the development of regional and state GIS within planning efforts at regional and state levels.

DCA efforts have focused on implementing and developing data and providing training and technical assistance to Georgia's 18 Regional Development Centers (RDCs), as well as developing data and implementing GIS in-house. A GIS Data Dictionary is maintained. Hardware and software specifications were developed by DCA for a statewide GIS network and workstations, allow-

ing for a variety of hardware and software to be used by network participants. DCA has developed a *Plan for GIS and Mapping Development in Support of Comprehensive Planning*, which describes its accomplishments and plans, including those for the RDCs, counties, and municipalities (see **Coordination Efforts, Groups and Activities**).

The Department of Natural Resources' Environmental Protection Division initiated a three-phased Comprehensive Data Management project with the U.S. Environmental Protection Agency in early 1985, and was later joined by the U.S. Geological Survey's Water Resources Division which was developing water data.

DCA's Office of Coordinated Planning staff expanded as a result of the Planning Act. The current staff includes 26 professionals, including 14 employees hired in late 1989 to provide necessary support for implementing the Planning Act. Current position descriptions include GIS Specialist and Senior GIS Consultant, both unclassified jobs. The staff includes 16 professionals working on the planning process and the development of regional and local comprehensive plans. The other ten staff members are building databases and consulting with various experts from other agencies, states and governments; they also coordinate GIS activities and pilot projects with the RDCs, and developing technical assistance programs and prototype comprehensive plans for local governments. DCA provides help in locating base maps, aerial photography, geodetic control points, and other geographic information resources. Their staff also provides support for all of the groups involved with geographic information and GIS coordination, with an allocation of six full-time staff members that work directly on GIS.

Implementation of GIS facilities began in the 18 RDCs with one-half of the necessary funding provided by the state. Of the total \$1.7 million appropriated by the state for the Planning Act in 1989, approximately \$1 million was allocated to the RDCs for GIS and planning needs. Annual expenditures for FY 1990 were just under \$1.3 million, almost all of which was state funded. Half of this expense was for GIS hardware and software. Predicted annual in-house expenditures are approximately \$300,000.

DCA currently is using ARC/INFO and Com-graphics software in-house for GIS, with four SUN workstations, six IBM personal computers, and 11 Macintosh personal computers. These computers are networked with a LAN. Two workstations are used to help DCA serve in its new role as manager of the new planning database and network. Oracle is being used as the database management system for data attributes to be used in GIS.

DCA is developing interim base maps at the 1:100,000 scale using U.S. Geological Survey's (USGS) DLGs and post-census TIGER line files. DCA will update the base map as changes are submitted from the RDCs. Each of the 18 RDCs have contracted with DCA to develop approximately 59 digital data layers at the 1:24,000 scale. Data layers which will be developed include transportation, hydrology, topology, land use, water distribution system sewerage collection system, public safety facilities, recreation locations, and educational, cultural and general government facilities. This five-year program is expected to be completed in 1996 and is being funded with \$2.5 million per year with a 50/50 cost share effort. The data will meet National Map Accuracy Standards and internal quality control standards have been developed by both the RDCs and DCA, with field checking of the data as well. Some of this data will be compiled by DCA for statewide layers, including land use and community facilities.

The **Department of Natural Resources' (DNR) Environmental Protection Division (EPD)** initiated a three-phased Comprehensive Data Management pilot project with the U.S. Environmental Protection Agency (EPA) in early 1985, and was later joined by the U.S. Geological Survey's Water Resources Division which was developing water data. Geographic services reside in and are mainly used by EPD, which provides data processing services for the entire department. Large data processing activities are also in the coastal program, and other divisions are in the process of developing GIS. Agency-wide GIS services are provided. DNR is in the process of institutionalizing GIS in the agency, and is developing data definitions for use with GIS data.

The Information Management Director at EPD serves as the chief for GIS in DNR, and his staff works directly on GIS activities. Other DNR employees using GIS do so as part of their program missions. The time spent by EPD's staff and others in DNR equals approximately four positions. In addition, DNR has one programmer for GIS located in the Geological Survey and two staff members are working directly on the development of the state's digital wetlands/land cover data layer as part of a contract with ERDAS. Current DNR

expenditures are approximately \$250,000, funded entirely by the state. No federal funding supports the DNR's GIS activities at this time, but the joint project with the U.S. EPA that ended in 1990 provided federal and state support for the development of data and applications now used by DNR.

Originally, DNR used ARC/INFO software located on the computing facilities at USGS' Water Resources Division and U.S. EPA. Since 1988, DNR has operated ARC/INFO on its own Prime computers, a model 2755 and a model 4050.

DNR's three-phased comprehensive data management pilot project with the U.S. EPA was initiated to meet a variety of needs facing the department, including the need for potable water in northern Georgia. The purpose of the project was to develop and implement data management systems that better support the environmental management objectives of both the state and U.S. EPA. It was also designed to provide model concepts, approaches and systems that enhance states/U.S. EPA partnerships. Georgia served as a National Pilot project for U.S. EPA, and benefited by using U.S. EPA's data and systems which also simplifying reporting obligations. U.S. EPA benefited by elimination of duplicative data entry, more timely data and reduced program misunderstandings. Funding for the project was provided by the state and U.S. EPA, with U.S. EPA contributing approximately \$600,000 of the total project cost of over \$1.5 million. The USGS' Water Resources Division also became a partner in the project as the division was at that time developing a statewide hydrography layer for the state.

During Phase I of the project, EPD worked with U.S. EPA to establish high-speed communications with U.S. EPA's main computers in Research Park, North Carolina. Full use of seven U.S. EPA National Base Systems was implemented to enable EPD to have direct management of its environmental programs through a delegated data management agreement process. These systems included Permit Compliance, Compliance Data, Hazardous Waste Data Management, Storage and Retrieval, Grants Information and Control, Storage and retrieval of Aerometric Data, and National Emissions Data. EPD prepared a *Technical Implementation Manual* and provided software to other states which described the concept and gave detailed instructions for use of computer screens. Phase I was subsequently implemented in other states.

Phase II of the project included the implementation of data integration systems across program lines to support environmental decision making, implementation of statewide GIS, and identification and use of database systems to support tox-

ics and risk assessment programs. The critical management issue was identified as the need to develop ground-water management strategy. Specific tasks included evaluation of siting applications, such as sanitary landfills; the review and support of local government decision making; collection of data concerning hazardous waste facilities; and identifying recharge areas susceptible to non-point source pollution from agricultural chemicals and Superfund sites, including identification of favorable sites for regional water supply reservoirs.

Phase III was initiated in 1988 and completed in May, 1990. The goal of Phase III was to increase the efficiency and effectiveness of environmental data management systems. While Phase I and II concentrated on data integration, Phase III was initiated to determine a way to better use derived information. Alternative methods for data entry were investigated, including optical scanning that would reduce the cost of data input and quality assurance. Several vendor products were considered in the evaluation. Vendor specifications and performance claims were not rated, but the criteria used helped to judge the suitability for transferring environmental data to existing database systems. A new form to meet Section 312 (SARA-Title III) needs was developed and scanned, and a program was written to load the scanned data into the appropriate fields of database files. After processing several data forms in the systems, the results show a five-fold decrease in operator hours compared to manual data entry. It is planned that GIS will be linked to this effort in the future.

Two applications were identified in Phase III to evaluate the effectiveness of the use of GIS in identifying environmentally vulnerable areas and their analyses. A scenario was developed for applying GIS to define vulnerable zones near public water supplies in accordance with the Federal Safe Water Drinking Act. Three municipal wells in Franklin, Georgia were evaluated for potential contamination from a leaking underground storage tank at a gasoline service station. Several GIS data coverages were selected to create a unique county GIS for Heard County (Franklin).

For a simulated oil spill on the ocean's coast, GIS data was prepared from selected coverages. When coupled with appropriate circulation and mass transportation models, the proximal relationships of the pollution plume to sensitive natural and biological resources became apparent. GIS was demonstrated to be effective for identifying areas particularly sensitive and for establishing a priority remediation action plan.

The third project conducted in Phase III concerned timely electronic notification to local

governments regarding oil/hazardous chemical spills that may threaten the environment or public health and safety. This project was initiated because local governments are frequently the first responders to hazardous chemical spills. The Coastal Resources Division was also involved to discover how an oil spill would affect the coast.

DNR is an active participant with the Department of Community Affairs (DCA) in the development of statewide GIS. These efforts include active participation with pilot projects conducted with the RDCs. For example, in one of two pilots funded by the state, the Central Savannah River Regional Development Center evaluated the utility of DNR's natural resources data used in GIS as a planning tool at the local level. DNR's GIS data was tested in coordination with DCA to evaluate data transfer from DNR to local planning agencies and RDCs. The project directors concluded that data sharing and transfer can be accomplished in an efficient and useful manner to maximize the value of information. The Savannah Center is now helping to upgrade DNR's information. As a followup to Phase II of the collaborative project with U.S. EPA, GIS help develops pollution susceptibility areas for each region. DNR is delivering maps to the RDCs showing areas soils, flood plain, groundwater recharge, and land use, among other data sets.

Currently, DNR primarily uses 1:100,000 scale DLGs from USGS. Efforts are underway to develop 1:100,000 aquifer recharge data, soils at 1:250,000 and land cover at 1:100,000. DNR has a contract with ERDAS Corporation to develop a digital 1:24,000 version of the wetlands/land cover data layer. DNR maintains hard copy and digital thematic mapper data from EOSAT, and this effort will update data in the National Wetlands Inventory. Project specific data is developed at the 1:24,000 scale, and the effort with DCA and RDC contracts will result in data at this scale. DNR makes extensive use of River Reach files, including 18 years of analytical data for parameters on streams. With 125 stations on surface water bodies, GIS services are used with the River Reach file system to plot the concentrations of each parameter over time and a regression line for each segment of each stream. In this way DNR is determining the degradation or improvement of each stream segment over time. Other data development efforts include soils and continuing efforts with USGS' Water Resources Division for data sharing.

In addition to the projects conducted in collaboration with U.S. EPA as part of each of the three phases of the Comprehensive Data Management Project, DNR is involved in other projects using GIS. Currently, one of the main projects is to

evaluate the suitability and priorities of sanitary landfill and hazardous waste sites. GIS has also been used to assist in the development of routing schedules for services, and for determining appropriate locations for water resources reservoir and planning for them. DNR may work on a pilot project with U.S. EPA for its EMAP program.

DNR's Geological Survey division is the main GIS user in the agency. It is using GIS to assist in evaluating groundwater areas. The Parks, Recreation, and Historic Sites Division collects data on activities such as historic trusts, and this division is considering use of GIS for its Historic Preservation Office and parks applications. The Game and Fish Division uses license fees to purchase land. GIS is also used to track state purchases. The Coastal Resources Division has a CAD system and attempts are being made to include it in GIS.

The **Department of Transportation (DOT)** has an extensive computer-aided drafting and design system using an Intergraph system. It is "evolving quickly to GIS" for road inventory, county road maps and a state base map, and is also active with GPS.

The **Office of Legislative Redistricting** purchased ARC/INFO for redistricting purposes. Plans exist to exchange data with both DCA and DNR for future applications.

Academic Activities

Both the University of Georgia and the Georgia Institute of Technology are actively involved with GIS. The **University of Georgia** is working with the legislature on its redistricting applications. It is also working on rural economic development projects and allocates 6.5 staff positions for GIS work, operating on an annual budget of over \$350,000. **Georgia Institute of Technology's** School of Planning is conducting graduate levels courses in GIS. It has an ESRI training site on campus that provides instruction in ARC/INFO throughout the southeast. Georgia Tech is also participating with DCA to develop mapping standards. Both universities plan to become active in the Georgia GIS Exchange effort, which includes state and federal agencies. One of the goals of the GIS Exchange is inventorying GIS/LIS initiatives and databases in Georgia to develop a common area registered GIS library, one composed of designated units of the University of Georgia and the Georgia Institute of Technology.

4 Documents List

Directives

House Bill 215: **Georgia Planning Act of 1989.**

This act was adopted "to provide a framework to facilitate and encourage coordinated, comprehensive statewide planning and development at the local, regional and state levels of government." It created the Governor's Development Council, and extensively revised provisions related to the Department of Community Affairs, the Board of Community Affairs, and area planning and development commissions. It also created regional development centers and provided for the powers, duties, and responsibilities of local governments and the Department of Natural Resources "with regard to the development and implementation of minimum land use standards to protect natural resources, environment and vital areas of the state." The act comprehensively provides the legal foundation, structure and programs for coordinated planning integrated between state government, and regional and local agencies.

Senate Bill 437: To create the State Mapping and Land Records Modernization Advisory Board, 1988.

This bill established the State Mapping and Land Records Modernization Advisory Board in accordance with the Joint Legislative LIS Study Committee's recommendations in their report of December, 1987. The board is administered by the Department of Community Affairs (DCA), as stipulated by the legislation. It provided for 21 members to be selected by the governor, including representatives of state agencies, the legislature, regional commissions, local governments, and associations with mapping interests. The purpose of the board was established to study land records modernization and to determine how to implement land information systems, provide financial incentives for local governments, encourage cost savings, sponsor public information and educational programs, and develop standards and technical specifications for GIS.

Senate Resolution 92: Creating the Land Information System Joint Study Committee, 1987.

Growth in local government LIS activities led to the legislature's establishment of the Joint Legislative LIS Study Committee in 1987 through Senate Resolution 92. The Committee was charged to "study the conditions, needs, issues and problems related to the status of land records in Georgia." It was also directed to "evaluate automation, determine the best way to assist local governments, determine necessary funding levels, and propose legislation."

Senate Bill 220: To Determine a Coordinate System, 1985.

This bill is related to the "determination of boundaries, so as to change the provisions relating to the coordinate system used in this state; to describe, define, and adopt officially a system of

coordinates for designating the geographic position of points on the surface of the earth within the State of Georgia, thus forming a base system for controlling and describing the location of surveying and mapping points; to provide for applicability of the Georgia Coordinate System."

Legislative Report Recommendations to Establish a State Mapping Advisory Board, Georgia Joint Legislative Land Information Systems Study Committee, December, 1987.

The Georgia Joint Legislative Land Information Systems Study Committee, composed of state executive, legislative, and local officials, was charged to "study the conditions, needs, issues and problems related to the status of land records in Georgia." It was directed to evaluate automation, determine the best way to assist local governments, determine necessary funding levels, and propose legislation. Conclusions of the committee included "land information has a direct affect on 90% of all local government decisions. As such the availability or unavailability of this information has an impact on a wide range of issues such as land conveyances, ad valorem tax administration, property tax inequities, resource allocation and growth management strategies and policies. The committee has determined that the current status of land information and land records are inadequate to provide the requisite foundation for Georgia's growth and development objects. There is an urgent need to initiate a program to correct this problem before it becomes a crisis." The committee recommended establishment of the State Land Information and Mapping Advisory Board.

Regulations

Rules of Georgia Department of Community Affairs, Chapter 110-3-2 Minimum Planning Standards and Procedures, Text and Executive Summary, Adopted by the Board of Community Affairs and Ratified by the Georgia General Assembly, January, 1990.

These standards and procedures, effective on October 1, 1990, are based on and structured by the Georgia Planning Act to govern the comprehensive planning process outlined in the legislation. The rules outline the goals of economic development, natural and historic resources, community facilities, housing and land use, and will be used as general guides in the preparation of local and regional plans. The duties and responsibilities of statewide groups and other entities are described, including participation in compiling the Georgia database and network. Steps, minimum planning elements, and a "Short Term Work Program" required in the planning process are also described. Provisions for variances, schedules for compliance, pre-existing plans, public participation and plan submission requirements are also included.

Publications

A Guide to Land Use Classifications for Georgia's Counties, Municipalities and Regional Development Councils, Department of Community Affairs Office of Coordinated Planning, Jim Higdon, Commissioner, September, 1991.

This document is a land use classification system for state, regional and local government agencies to use in preparing comprehensive plans in accordance with Georgia's Planning Act of 1989. It incorporates several land classification concepts, including the Standard Industrial Classification Code (SIC), the Land Cover Classification Code (Anderson, Level 2) of the U.S. Geological Survey, and the Standard Land Use Classification Code (SLUC) introduced by the American Planning Association. While each of these systems is used for specific purposes, local governments typically use classifications based on zoning categories. This document draws from all of these systems except the zoning based systems. It states that "the most significant impact of a statewide standardized land classification system will be felt at the county level in the preparation of county tax maps and land use maps . . . [it] will enable land data collection and information transfers to be made from a variety of sources."

A Guide to Community Facilities Classifications for Georgia's Counties, Municipalities and Regional Development Councils, September, 1991.

This document provides classifications for community facilities including water and waste water treatment plants, police and fire stations, other public buildings, parks, water reservoirs, railroads, etc.

Georgia GIS Exchange: Constitution, Bylaws, and Charter, Georgia GIS Exchange, May, 1991.

The Georgia GIS Exchange is established "under the general authority of the Atlanta Federal Executive Board in accordance with the wishes of the President of the United States and the U.S. Congress." Its purpose, as described in the Constitution and Bylaws, is to promote the development of personnel; provide opportunities to exchange knowledge related to GIS techniques, applications, databases, and cost reduction ideas; assist and advise on GIS matters, and publicize activities for the general public. Members are selected from government agencies in the eight southeastern states; however, membership now includes federal agencies and state agencies in Georgia. Goals of the GIS Exchange include inventorying GIS/LIS initiatives and databases in Georgia and other states; assessing current needs; developing useful databases; and developing a common area registered GIS library to be composed of designated units of the University of Georgia and the Georgia Institute of Technology.

1990 Annual Progress Report, Georgia State Mapping Advisory Board, February, 1991.

This report reviews the activities and recommendations of the State Mapping Advisory Board (SMAB) and its four subcommittees, as well as providing lists of member groups. These groups include the Mapping Standards, TIGER file, Land Records and Legislation and Finance Subcommittees. The report also reviews some of the recommended steps developed the previous year and described in the first annual report. The Mapping Standards Subcommittee worked to develop a comprehensive "Georgia Mapping Guide" which provides guidelines for local, regional and state planning in Georgia, and addresses standards issues. It also recommended that legislation authorizing the preparation of a scale-accurate statewide base map of Georgia at a scale of 1' = 400'. The TIGER file Subcommittee evaluated the need for coordinating address improvements, with consideration given to mandating improvements and establishing a uniform system across the state. The Subcommittee also discussed the related activities of House Bill 1422 (Substitute) known as the "Georgia Emergency Telephone Number '911' Service Act of 1977," which provides for a fee of up to \$1.50 to be collected from each telephone customer for E-911 services. The Land Records Subcommittee analyzed conditions and determined that a land records management improvement program was needed, and recommended a three step approach. The Legislation and Finance Committee recommended that an add-on surcharge to the fees associated with real estate filing and recording documents be established. In consideration of the activities and recommendations of the Subcommittees, the SMAB proposed a resolution to create a joint legislative committee, the "Georgia GIS Study Committee," which would study cooperative methods for implementing a statewide basemap and GIS. SMAB also recommended that SMAB become a permanent Board with administrative funding support and a permanent staff.

First Year Progress Report, Georgia State Mapping Advisory Board, 1989.

This report reviews the progress of the board's first year. It describes the issues raised by its four subcommittees, including Mapping Standards, Data Standards, Education and Financing. Findings and recommendations of each of these topics is included. Among the conclusions reached, the board recommended that the state assist in standardizing, updating and modernizing land records and implementing GIS by assisting local governments and RDCs "through financial incentives, coordination of data acquisition and programs to share data, and technical assistance programs."

The report called for data and mapping standards, including standards for land characteristic data for planning, uniform map accuracy standards, geodetic control densification, and common data definitions, data file formats and protocols. A data dictionary and common statewide database is also recommended. Computer-based property valuation was favored by a majority of the board, and all agreed that GIS, through an implementation plan and educational program should be supported, particularly for local governments.

Plan for GIS and Mapping Development in Support of Comprehensive Planning, Georgia Department of Community Affairs, 1991.

This plan describes the accomplishments and plans of the Department of Community Affairs regarding GIS and digital data development at the state, regional and local level. It also includes an inventory of data maintained by the Department of Natural Resources, and describes tasks and schedules for GIS and mapping in Georgia (see **Document Excerpts**).

Georgia Mapping Standards Guide, Georgia State Mapping Advisory Board, December, 1991.

The Georgia Mapping Standards Guide includes requirements for map accuracy standards for state, regional and local government agencies and recommends map projection and referencing systems. The guide also includes mapping and spatial data exchange standards that can be employed in requests for proposals, and bids, and contracts with vendors for aerial photography and mapping services. It includes technical specifications for aerial photography, photolaboratory procedures, horizontal and vertical control including GPS, analytical triangulation, preparation of base maps, cartographic and orthophoto base maps, topographic maps, cadastral maps, soil maps, and digital mapping. It also includes an integrated property identification numbering (PIN) system and a map identification system. Map tiles of 1000x1000 meters based on the state plane coordinate system are included.

DRAFT Data Dictionary, Department of Community Affairs Office of Coordinated Planning, Jim Higdon, Commissioner, July, 1990.

The data dictionary was developed for state agencies, regional development centers and local governments to use in the classification of planning-related data and as the source of symbology to put on maps. It includes a list of terms likely to be used in most databases and map legends and formats.

Georgia/U.S. EPA Comprehensive Data Management Project Phase III, Department of Natural Resources, Environmental Protection Division, May 3, 1990.

This report was prepared for Phase III of the

Comprehensive Data Management Project undertaken by the Department of Natural Resources' Environmental Protection Division, and was partially funded by the U.S. Environmental Protection Agency (EPA). The goal of this phase was to increase the efficiency and effectiveness of environmental data management systems. While Phase I and II concentrated on data integration, Phase III was initiated to determine a way to better use derived information. It also investigated other methods for data entry, including optical scanning to reduce the cost of data input and quality assurance. GIS was also used to identify vulnerable environmental areas, and to implement electronic notification of local governments as first responders to hazardous chemical spills. The report includes a thorough description of work conducted for each of these three efforts, as well as background information about the entire project. Conclusions and recommendations are also provided.

Glossary of LIS/GIS Terms, Department of Community Affairs, Government Information Division, Jim Higdon, Commissioner, August, 1988, (Abstracted from International Cartographic Association's Glossary of Terms in Computer Assisted Cartography)

On-Line Databases, Department of Community Affairs Office of Coordinated Planning, 1990.

This listing provides information about wage and salary surveys, finance, local government operations, intercensus estimates and projects, and other state agency data that is available for local governments.

Georgia GIS Information Sharing Pilot Project, Chelsea International Corporation, December, 1989.

This report describes a pilot project in which the Central Savannah River Regional Development Center (RDC) evaluated the potential use of the state Department of Natural Resources' (DNR) GIS as a planning tool at the local level. DNR's GIS data was tested in coordination with the Department of Community Affairs to evaluate data transfer from DNR to local planning agencies and RDCs. The projects concluded that data sharing and transfer can be accomplished in an efficient and useful manner to maximize the value of information.

Final Progress Report: GIS for Industrial Parks, Central Savannah River Area Regional Development Center, September 29, 1989.

This report describes how the Central Savannah River Regional Development Center (RDC) conducted a pilot project to evaluate the use of databases and GIS for economic development, specifically concerning industrial parks. As a result of the project, various data transfer techniques

were established, and participants were able to exchange digital data. For example, the electric supplier, Georgia Power, shared data from an RDC. The resulting standardized base data for the area helped the participants present and market industrial parks to business prospects.

Final Report of the Data Needs Work Group, Georgia Data Needs Work Group, July, 1989.

The Data Needs Work Group was established with representatives from state agencies, the University System, regional organizations, local governments, utilities and private companies to provide recommendations for the comprehensive and coordinated database network needed to support the recommendations of the governor's Growth Strategies Commission. It concluded that a distributed database and information exchange network was needed and stated that "we strongly recommend that all implementation efforts support the ultimate development of GIS at the state, regional and local levels." The report provides a conceptual model of a database and network which would generate, maintain and distribute data. The goal is to develop as open a system as possible, one which includes a distributed database. The Department of Community Affairs would serve as the single state agency responsible for coordinating the database and network to support coordinated planning. "Core data elements" were also recommended by the work group.

Quality Growth Partnership: The Bridge to Georgia's Future, Final Report of the Governor's Growth Strategies Commission, November 2, 1988.

This report established the "Quality Growth Partnership" as a blueprint for the state's future. The goal of the partnership is to accommodate "inevitable growth . . . without deterioration in quality of life," and upgrade low-growth areas through economic development programs. It recommends a nine-point strategy to address "human needs, build the capacity for growth, safeguard the environment, strengthen local communities, and coordinate state and local efforts." It also recommends that "a coordinated data network be put together with participation by local, regional, state agency and private sector groups to assist those groups in developing demographic, economic, and physical trends and projections."

Using GIS for Environmental Decision Making, Georgia Department of Natural Resources, 1988.

This report was prepared as part of Phase II of the Comprehensive Data Management Project, undertaken by the Department of Natural Resources' Environmental Protection Division. The project was partially funded by the U.S. Environmental Protection Agency (EPA). The purpose of the project was to develop and implement data management systems to better support the environmental management objectives of both the state and U.S. EPA. It was also designed to provide model concepts, approaches and systems to enhance states/U.S. EPA partnerships for other states. Phase II of the project included the implementation of data integration systems across program lines to support environmental decision making, implementation of statewide GIS, and identification and use of database systems to support toxics and risk assessment programs. The critical management issue was identified as the implementation of a groundwater management strategy. Specific applications included siting evaluations, such as sanitary landfills siting, the review and support of local government decision making; hazardous waste facilities; and identification of recharge areas susceptible to non-point source pollution from agricultural chemicals and Superfund sites, as well as identification of favorable sites for regional water supply reservoirs.

Georgia Mountains Regional Development Center Innovative Project Final Report, Georgia Department of Community Affairs, September, 1990.

Implementation Plan for a Regional Geographic Information System, Atlanta Regional Commission, September 1990.

Computer Aided Routing and Scheduling Pilot Project, Georgia Department of Community Affairs, February, 1991.

Paper

Establishing a Statewide Database and Network to Support Coordinated Planning: Background and Preparation. (Background Paper), Georgia Department of Community Affairs, 1989.

This paper explains that three building blocks, a database, data network and GIS, will contribute to coordinated planning by local governments, regional development centers, and state agencies. It reviewed past activities and proposed consultation of four key groups and their recommendations for the building blocks. It outlines a plan of items to be accomplished in FY 1990.

Document Excerpts

DEPARTMENT OF COMMUNITY AFFAIRS PLAN FOR GIS AND MAPPING DEVELOPMENT IN SUPPORT OF COMPREHENSIVE PLANNING

I. Introduction

The main objective of the GIS program is to provide a statewide GIS network that supports the provisions of the Minimum Planning Standards outlined in the Georgia Planning Act of 1989 and to provide data and automated map coverages that can be used to facilitate local planning. Other objectives of the GIS Program include the development of regional and state GIS's to aid planning efforts at the regional and state levels.

II. GIS Development at DCA

GIS development at the Department of Community Affairs consists of developing a statewide, multiple workstation GIS that will be linked to 18 Regional Development Centers, and to participating local governments. DCA will provide maps, data, training and technical assistance to RDCs and local governments in the development of their information systems. Activities include:

A. Data Dictionary

The Department of Community Affairs will continue to refine and expand a comprehensive GIS Data Dictionary. The Data Dictionary presently consists of a glossary of mapping, data and GIS terms.

In the near future, it will be expanded to include item definitions of all databases, record and file layouts, map coverages and mapping symbols.

B. GIS Hardware and Software Specifications

The Department of Community Affairs prepared hardware and software specifications for a GIS network and workstations. These specifications were prepared to permit voluntary participation, and allowed a variety of hardware components and software to be used by network participants.

C. GIS Development Technical Assistance

The Department of Community Affairs has developed comprehensive GIS hardware, software, mapping and data specifications and will provide technical assistance to RDCs and local governments in implementing systems that utilize these standards. The Department has provided funding and/or technical assistance in the development of GIS systems, maps and databases in all the Regional Development Centers, and several local governments. An analysis of the procedures appropriate in developing a regional GIS was funded by DCA as well. DCA staff has been involved in providing materials and training to local governments and anticipate an expanded role in this activity.

III. Development of Mapping Standards and Products

The objective of the mapping program is to develop mapping standards and products that are appropriate for use by participants in the statewide geographic information system. The Department will prepare and/or support the preparation of scale accurate aerial photography and maps made from such imagery. Department staff will coordinate the acquisition of geodetic control, appropriate imagery base maps, and land features maps that support the preparation of plans and supporting GIS networks as required by the State Planning Act of 1989. Specific elements of the work program include:

A. Mapping Standards

Initially the Department of Community Affairs will focus on providing administrative assistance to the State Map-

ping Advisory Board in its efforts in developing statewide mapping standards.

Aerial photographic and mapping standards are presently being developed by the Mapping Standards Subcommittee of the State Mapping Advisory Board. The standards will include coordinate systems, map projections, map scales and accuracy requirements for each, digital map formats and symbols and map file exchange formats.

B. Geodetic Control

First and second order geodetic control points from the National Geodetic Survey have been obtained and are presently being automated. The Department of Community Affairs shares the employment of a geodetic advisor with the National Geodetic Survey, and responds to statewide requests for geodetic control data and/or assistance in establishing geodetic control maintenance programs.

C. Aerial Photography

The Department of Community Affairs participated in a U. S. Geological Survey Aerial Photography project of Georgia in 1988.

This project produced aerial photography with geodetic control capable of producing scale-accurate photography and planimetric maps that meet National Mapping Accuracy Standards. It is anticipated that a similar joint project will be undertaken with USGS in 1993.

D. Base Map

The Department of Community Affairs will develop interim base maps at a scale of 1:100,000 using USGS digital line graphs and post-census TIGER line files. The Department shall also be responsible for updating the base map as changes to the map are submitted from the RDCs. The Department shall pursue obtaining more accurate and detailed base maps at a scale of 1:24,000 using geodetically controlled aerial photography in 1993.

E. Templates

Templates to be developed include city, county, regional, and state boundaries, USGS 7.5 in quad outlines, and the State Plane Coordinate System grid. These templates will allow the selection and distribution of data for specific areas.

F. Significant Ground Water Recharge Areas

This coverage has been received from the Department of Natural Resources and is at a scale of 1:500,000.

G. Pollution Susceptibility by RDC

This coverage is also to be received from the Department of Natural Resources as it is processed for each region.

H. Wetlands/Land Cover

These maps are being developed under a DNR contract by ERDAS and will be distributed to the Regional Development Centers as soon as they are available.

I. Other Coverages from the Department of Natural Resources

The coverages being developed by United States Geological Survey and the Department of Natural Resources are listed in Attachment

A. These coverages will be distributed to the Regional Development Centers as they are received from the Department of Natural Resources.

J. Creation of a Statewide Land Use Map

The Department of Community Affairs shall compile a state wide land use map. This map shall consist of a compilation of the regional land use maps developed by the Regional Development Centers.

K. Creation of a Statewide Community Facilities Map

The Department of Community Affairs shall compile a state wide community facilities map. This map shall consist of a compilation of the regional community facilities maps developed by the Regional Development Centers.

IV. GIS and Mapping Development at the Regional Development Centers

A. City Planning Base Map Preparation/Update

The Regional Development Centers may assist cities in their region in preparing initial or updating existing base maps that will be directly used to meet the requirements of the Minimum Planning Standards and Procedures. The maps will be consistent with the scales and accuracy of the map standards developed by Department of Community Affairs.

B. Regional Land Use Maps

As local government plans are completed and certified by the Department of Community Affairs, the Regional Development Centers shall initiate compilation of land use data that can eventually form region-wide existing and future land use maps at a scale of 1:24,000 using the USGS 7.5 min quads.

C. Regional Community Facilities Map

As local government plans are completed and certified by the Department of Community Affairs, the Regional Development Centers will develop regional community facility maps at a scale of 1:24,000 using the USGS 7.5 minute quads.

The formats for compiling this data and preparing the maps will be prescribed by the Department of Community Affairs, with input from the Regional Development Centers.

D. Regional Data Dictionary

The Regional Development Center shall define, enhance and adopt a regional data dictionary that will provide additional detail on topics such as land use, demographics, etc. This will be a further refinement of the State's Dictionary.

E. Standards and Procedures for Data Exchange

The Regional Development Center shall develop standards and procedures for exchange of data from the Regional Development Center to local governments. Basic data exchange standards have already been developed for the Department of Community Affairs and the Regional Development Centers. This process should be taken a step further and the Regional Development Centers should develop minimum standards to share data with their local governments.

F. TIGER Base Map

The Regional Development Centers may maintain, and distribute the digital TIGER base maps to local governments in the region as requested. Changes that are made in the regional TIGER base map shall be submitted to the Department of Community Affairs, Georgia Geographic Information Center.

G. Regional Geographic Information Services

The Regional Development Center shall continue strengthening cartographic capabilities and coordinating with the Georgia Geographic Information Center and local governments in the region.

H. Enhance Data Handling Capabilities

The Regional Development Center may purchase additional computer hardware and software needed to enhance its computer capabilities.

All purchases are to be approved in advance by the Department of Community Affairs.

V. GIS and Mapping Development at the County Level

A. Base Maps

The counties will be encouraged to develop new base maps through cooperative projects with their Regional Development Center. The Department of Community Affairs is furnishing USGS 7.5 minute quad maps to the counties. This map can be used if the county is unable to develop a new map, or presently does not have an adequate map.

B. Land Use Maps

The counties shall compile maps of existing and proposed future land use using the maps developed by the cities. The county land use map should be compiled on a USGS 7.5 minute quad map, or a better map if available.

C. Community Facilities Maps

The counties may compile maps of their community facilities using a USGS 7.5 minute quad map, or a better map if available.

VI. GIS and Mapping Development at the City Level

A. Base Maps

The cities will be encouraged to develop new base maps through cooperative projects with their Regional Development Center. The Department of Community Affairs is furnishing Department of Transportation city street maps to the cities. This map can be used if the county is unable to develop a new map, or presently does not have an adequate map.

B. Land Use Maps

The cities shall compile maps of existing and proposed future land use using the maps developed by the cities. The city land use map should be compiled on the best available map.

C. Community Facilities Maps

The cities may compile maps of their community facilities using the best available map.

VII. Schedule & Responsibilities

The schedule for DCA to distribute maps is dependent upon receiving map coverages from DNR and the availability of staff time to develop coverages.

VIII. Conclusion

The GIS and mapping activities outlined in this plan will help to support the comprehensive planning effort in Georgia. The success of the program will depend on the proper training of planning and GIS staff, education of local officials, the development and adoption of standards, and a commitment to continued funding.